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Description

METHOD AND APPARATUS FOR SLEEVING COMPRESSED BALE MATERIALS

BACKGROUND OF INVENTION

[0001] This application claims priority to US provisional application 60/480,258, filed June 23, 2003 and to Canadian patent application 2,432,828, filed June 20, 2003.

[0002] The present application relates to baling apparatus and methods.

[0003] The formation of hay bales is, of course, well known. Such balers are used in agricultural operations in the field to form harvested hay into bales having generally either rectangular or circular dimensions. The bales so formed allow improved handling and storage and have a weight, which allows convenient manipulation following their formation. Such bales are typically stored and used in locations relatively close to the harvesting location.

[0004] Commercial markets have now been established for forage in locations far removed from where the forage crop

is harvested and formed into bales. For example, in Asian countries markets have opened for forage from material harvested in North America and Australia. Thus, the transportation and warehousing storage of such forage at a reasonable cost and maintaining such forage in marketable condition during transportation has become an important focus in order to profitably sell such forage.

[0005] Forage compactors to recompact standard hay bales are known. Such compactors generally act to take standard hay bales, separate the material making up the bales and recompact such material at a density which is much greater than the density of the forage in a standard bale while retaining generally the same dimensions. Thus, the recompacted bale may be shipped utilizing a far more efficient volume of space with an increased quantity of forage making up the bale constrained by straps.

[0006] Of late, there has been a desire to use sleeves, rather than straps, to contain the compressed bales. The sleeves are generally tubular having two opposed open ends and formed of flexible material that contains the bale materials and substantially prevents expansion thereof after compression. Current sleeving processes produce a bale wherein the sleeve extends off one or both of the ends of

the bale and requires a person to manually maintain contact between the bale and the sleeve. There has been a desire in the industry to provide sleeved bales that have a tidier appearance, improved dimensions and to use less sleeving material, when compared to previous sleeved bales.

Summary of Invention

[0007] A method for sleeving compressed bale materials has been invented.

[0008] In accordance with a broad aspect of the present invention, there is provided a method for sleeving a bale of materials, the method comprising: positioning the bale to be sleeved between a pair of holding platens, the holding platens including a first platen including a holding face and a second platen spaced from the first platen and including a holding face directed toward and positioned in a substantially parallel plane to the first platen holding face, the bale in the platens having a leading end and a trailing end; placing a sleeve, having opposed first and second open ends, over the holding platens and the bale therebetween; positioning the sleeve such that its first open end is aligned with or spaced back from the bale leading end and the sleeve engages against the bale; and ejecting the

bale from the platens such that it draws the sleeve with it.

[0009] The method may produce a bale with the entire sleeve positioned over the bale and the ends of the sleeve aligned with or spaced back from the ends of the bale.

[0010] The holding platens can be formed in various ways. In one embodiment, the platens are mounted about a chamber from which the bale is ejected after it is compressed. In this way, the compressed bale is ejected into correct position between the platens. In such an embodiment, the holding platens include a chamber proximal end and an outboard end extending out from the chamber proximal end. The platens can be formed to taper from their chamber proximal ends to their outboard ends so that there is reduced resistance to the sleeve being urged over the platens and to the sleeve being dragged from the platens by the bale.

[0011] In one embodiment, the platens are positioned such that when the bale is positioned between the platens its upper surface is open for contact and frictional engagement with the sleeve. As such, the sleeve rests by gravity on the upper surface of the bale, when it is positioned over the platens and bale. The platens can be sized to engage the sides of the bale, but be recessed back from the edges so

that the sleeve comes into contact with the bale, for example at the bale's corners, when it is placed over the platens holding the bale. The platens can also include chamfered side edges to ease the transition from the bale surface to the platen surface and to reduce the volume of the platens on either side of the bale.

[0012] In one aspect of the method, a sleeve may be selected such that it has a length between its first and second open ends that is at most equal to the length of the bale between the leading end and the trailing end. In some embodiments, the sleeve is selected to have a length between its first and second open ends that is less than the length of the bale between the leading end and the trailing end.

[0013] The process may require correct positioning of the sleeve open end relative to the bale leading end such that the sleeve does not extend past the end of the bale. To facilitate the process, the platens can be provided with indicators to assist in the correct positioning of the sleeve relative to the bale, with consideration to the length of the bale being produced and the correct position of the bale in the platens. For example, the platens can be fit with or produced to support a sleeve position indicator such as a

marking or a stopper plate, against which an end of the sleeve can be butted when it is fed over the platens. It is noted, however, that the sleeving process does not require manual involvement in urging the bale into engagement with the sleeve, after it is placed.

[0014] In accordance with another broad aspect of the present invention, there is provided compressed bale holding platens comprising: a first platen including a holding face and a second platen spaced from the first platen and including a holding face directed toward and positioned in a substantially parallel plane to the first platen holding face, the platens mounted in relation to a bale compression chamber and positioned to accept a bale ejected from the chamber; and a marking on the platens to guide the correct positioning of a sleeve thereover.

Brief Description of Drawings

[0015] Figures 1a to 1d are isometric, front, top and side views, respectively, of one embodiment of compressed bale holding platens.

[0016] Figures 2a to 2d are isometric, front, top and side views, respectively, of the holding platens of Figures 1 with a bale positioned therein.

[0017] Figures 3a to 3d are isometric, front, top and side views,

respectively, of the holding platens of Figures 1 having a bale positioned therein and including a sleeve positioned thereover.

[0018] Figure 4a is an isometric view of another embodiment of compressed bale holding platens and Figure 4b is a sectional view along line I-I of Figure 4a.

Detailed Description

[0019] Referring to the drawings, one embodiment of compressed bale holding platens are shown. The platens include a first platen 2 including a holding face 4 and a second platen 6 spaced from the first platen and including a holding face 8 directed toward and positioned in a substantially parallel plane to the first platen's holding face. The platens, in the illustrated embodiment are secured to a mounting frame 10, for mounting in relation to a bale compression chamber (not shown) in a position to accept through an opening 11 a bale 12 ejected from the chamber. Mounting may, for example, be through brackets and apertures 13.

[0020] Each platen has a chamber proximal end adjacent mounting frame 10 and an outboard end 14 extending in an unsupported manner from the chamber proximal end. The thickness of each platen, defined between its holding

face, for example 4, and its backside surface 15, may taper substantially from the chamber proximal end to the outboard end.

[0021] The platens are formed to secure a bale therebetween as it is ejected from a bale compression chamber of a bale compactor. The operation of the bale compactor may push the bale through opening 11 and into position between the platens. The bale may therefore have an end that can be defined as a leading end 12L and a trailing end 12T. The platens maintain the bale against expansion until it can be fitted with a sleeve 16. It is noted that, if desired, the sleeve may have a circumference no larger than that required to extend about the platens and the exposed portions of the bale.

[0022] In one embodiment, the platens may be positioned such that when the bale is positioned between the platens, the bale's upper surface 12a is open for contact and frictional engagement with the sleeve. As such, the sleeve may rest by gravity on the upper surface of the bale, when it is positioned over the platens and bale. The bottom of the bale may also be open for engagement with the sleeve, if desired.

[0023] The platens can be sized to engage the sides of the bale,

but be recessed back from the edges so that the sleeve comes into contact with the bale, for example at the bale's corner edges 12b, when it is placed over the platens holding the bale. The platens can also include chamfered side edges 20 to ease the transition from the bale surface to the platen surface. As such, the platens tend not to obscure the bale such that the sleeve may be in contact with more surface area of the bale. Also, chamfering the platen edges reduces the sleeve circumference that is required to encircle the platens and bale and reduces the sectional area of the platens to reduce the volume they take up within the sleeve, such volume becoming empty space into which the bale materials can expand.

[0024] With reference to Figures 4, in one embodiment one or more bale cutting blades 22 may be mounted between the platens 2, 6 to cut a bale as it is moved into position between and through the platens. The blade includes a cutting edge 24 positioned to act against the bale as it is pushed through opening 11. The blade may be mounted in various ways between the platens, for example with its ends extending through slots 26. In such a mounting configuration, a protrusion 28 may be formed or positioned on blade 22 to maintain its position relative to the

platens.

[0025] The bale can be produced by a compacting machine that compacts the bale, such that it will expand if not contained once it is ejected from the machine. In one embodiment, the bale is produced by a machine that causes the bale to have a greatest direction of expansion along an axis X extending between its side surfaces, which are the ones in contact with the platen holding faces. In another embodiment, the produced bale tends to have substantially no expansion along an axis opposite the axis X between the platen holding faces. Forage compactors, such as those known as the Hunterwood™FC 7600, Hunterwood™ FC 9322 and others available from Hunterwood Technologies Ltd., Cochrane, Alberta, Canada, are suitable for producing bales having such a compression/expansion characteristic.

[0026] Sleeving is a method of placing a sleeve directly onto a compressed bale. In one embodiment, the present method includes placing a sleeve directly onto a compressed bale while it is in the holding platens so that the sleeve will hold the compressed bale from expanding back to its original size once it is ejected from the platens.

[0027] According to a sleeving method of the present invention,

a bale 12 to be sleeved is positioned between holding platens, such as those shown as items 2 and 6 in Figures 2. With reference to Figure 3, a sleeve 16, having opposed first and second open ends, 17a, 17b, respectively, is then placed over (arrow A) holding platens 2, 6 and the bale. The sleeve may be positioned such that its first open end 17a is aligned with or spaced back from the bale leading end 12L and is in engagement with, as by touching, the bale. The bale is then removed (arrow B) from the platens, drawing the sleeve with it. This sleeving procedure, thus, requires no manual intervention to maintain contact and/or correct positioning of the sleeve on the bale, although manual assistance may be provided if desired. In the illustrated embodiment, the platens include a stopper plate 18, against which an end of the sleeve can be butted when it is fed over the platens to ensure correct positioning thereof. Although stopper plates 18 are shown mounted on backside surfaces 15 of both platens, it is to be understood that only one stopper plate need be used and that the stopper plates may be positioned elsewhere, for example on an upper or lower edge of one or both platens or on an adjacent structure and extending out close to one or both platens. Stopper plates 18 may be replaced

with another form of marking 18a (Figure 4a), on one or both platens, as by use of paint, a welded bead or etching of the platen surface.

[0028] Example

[0029] In one method for example using a Hunterwood Press, the steps may be as follows:

[0030] 1.Ensure that a person conducting the sleeving (the operator) has a supply of the sleeves for the holding platens. The sleeve should have two opposed open ends and for esthetic purposes and to reduce the amount sleeve material used, the sleeve may be selected to have a length from end to end no longer than the compressed bale length from trailing end to leading end. A supply of sleeves may be placed adjacent to the holding platens for convenience.

[0031] 2.The operator stands near the platens of a bale press for producing a compacted bale.

[0032] 3.The operator selects one sleeve and opens it up.

[0033] 4.When a compressed bale is correctly positioned inside the platens, such as by entering from a compacting chamber through a frame, such as frame 10 in Figures 1, the operator may place a sleeve to encircle the platens and

the bale. In one embodiment, the press may pause to allow time for this operation. In one embodiment, a machine indicator such as a light will emit a signal indicating that it is an appropriate time to place a sleeve over the bale and platens. The operator places the sleeve directly onto the compressed bale (arrow A) until an end of the sleeve is lined up with the stopper plate, if it is provided. This will, depending on the relative lengths of the bale and sleeve, either line up the ends of the sleeve with the ends of the bale or leave an exposed bale portion at the leading and possibly also the trailing end sticking out beyond the sleeve. By sleeving directly onto the compressed bale, the operator can insure the best possible appearance. For esthetic reasons, the operator may wish to ensure that the sleeve is centered and straight as no further adjustment will be possible.

[0034] 5.The operator then stands back after the sleeve has been placed.

[0035] 6.When actuated, the press will then eject the compressed and sleeved bale. This generally occurs when a next compressed bale is introduced into the platens.

[0036] 7.The sleeved bale will then be taken away from the platen area.

[0037] 8.The operator then gets ready to sleeve the next compressed bale and repeats steps 1 through 5 again.

[0038] Depending on the bale press model being used for sleeving, the operator will have generally between 14 seconds and 80 seconds in which to place the sleeve correctly. On the faster machines, more than one operator may be required to assist.

[0039] The foregoing is simply an example of one possible method and is not intended to be used to limit the scope of the invention.

[0040] Numerous modifications, variations and adaptations may be made to the particular embodiments described above without departing from the scope of the invention as defined in the claims.